

A REVIEW OF THE NEW RIODINID BUTTERFLY GENUS *PANAROPSIS*
(LEPIDOPTERA: RIODINIDAE: SYMMACHIINI)

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Abstract.—A new riodinid genus *Panaropsis*, tribe Symmachiini, is described and illustrated from Central and South America. Four species are recognized: *elegans* Schaus and *semiota* Bates transferred from *Pterographium* Stichel (**n. comb.**), and *thyatira* Hewitson and *inaria* Westwood transferred from *Esthemopsis* C. and R. Felder (**n. comb.**).

Key Words: *Esthemopsis*, Neotropical, *Pterographium*, *Panaropsis*, Symmachiini

The purpose of this paper is to describe and characterize a new riodinid genus in the tribe Symmachiini to provide a generic name for *elegans* Schaus 1920, *semiota* Bates 1868, *inaria* Westwood [1851] and *thyatira* Hewitson [1853], currently treated in *Pterographium* Stichel 1910 and *Esthemopsis* C. and R. Felder 1865, for a forthcoming morphological survey of male androconia in the Riodinidae (Hall and Harvey, in press). The tribe Symmachiini has been adequately diagnosed elsewhere (Harvey 1987, Hall and Willmott 1996) and this information is not repeated here.

METHODS

Dissections were made using standard techniques, after abdomens were soaked in hot 10% potassium hydroxide solution for approximately five minutes, and subsequently stored in glycerol. The terminology for male and female genital and abdominal structures follows Klots (1956) and Eliot (1973), while nomenclature for wing venation follows Comstock and Needham (1918). The taxonomic status of names is based on the catalog of Callaghan and Lamas (in press).

All the collections listed by Hall (1999)

were examined to determine the ranges of *Panaropsis* species. The following collection acronyms are used throughout the text: AME: Allyn Museum of Entomology, Florida Museum of Natural History, Sarasota, FL, U.S.A.; BMNH: The Natural History Museum, London, England; MNRJ: Museu Nacional, Rio de Janeiro, Brazil; MUNB: Museo de la Universidad Nacional, Bogotá, Colombia; USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, U.S.A.; ZMHU: Zoologisches Museum für Naturkunde, Humboldt Universität, Berlin, Germany.

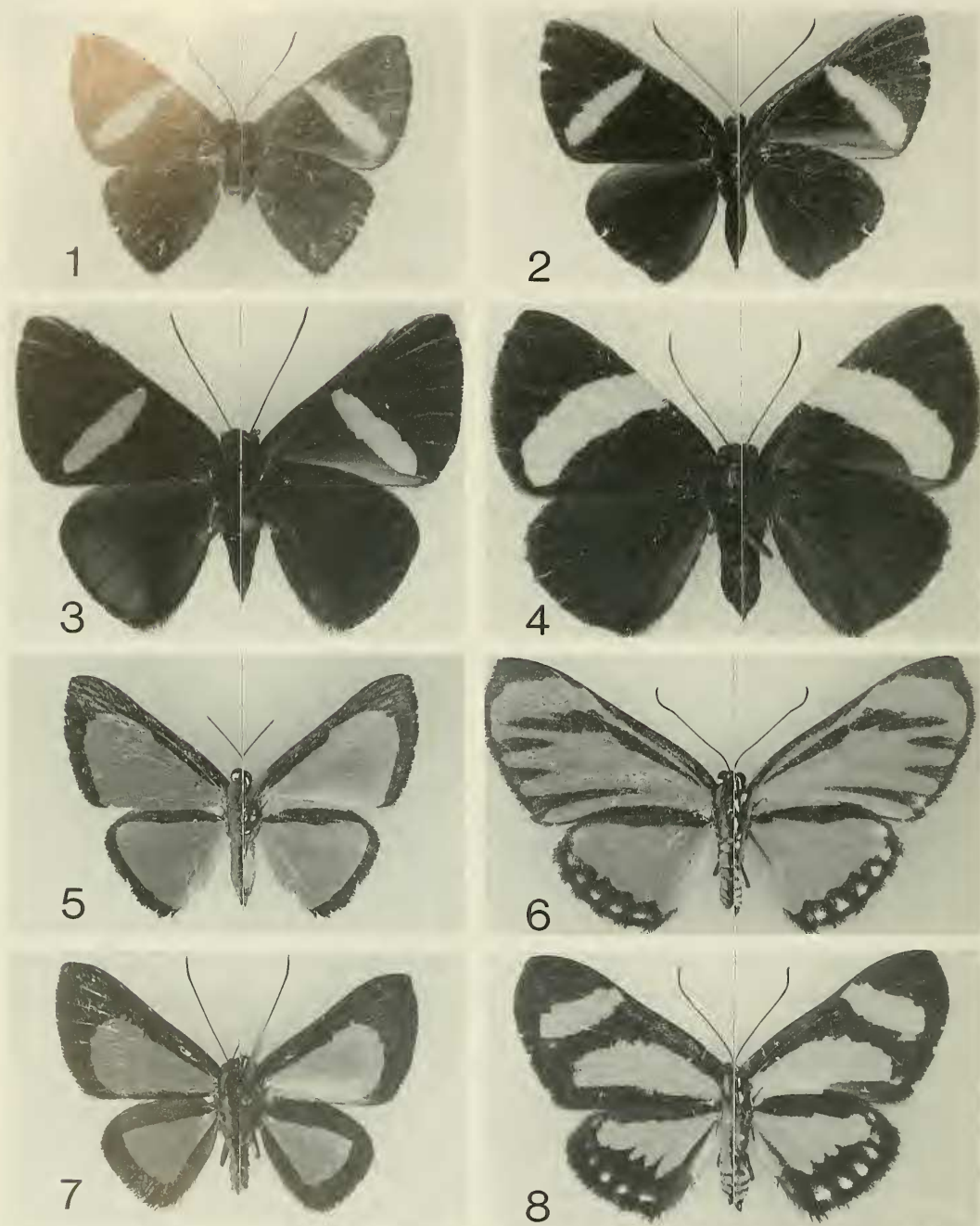
SYSTEMATICS

***Panaropsis* Hall, new genus**
(Figs. 1–8, 9, 10–14, 15–17, 18)

Type species.—*Panara elegans* Schaus 1920.

Etymology.—The name alludes to the superficial similarity between members of the riodinine genus *Panara* and the type species *elegans*, which was formerly placed in *Panara*.

Description.—*Male*: Forewing length 17–20 mm. *Wing shape*: both wings typically somewhat elongate; forewing costa very slightly arched at base, distal margin



Figs. 1-8. Adults (dorsal surface on left, ventral surface on right). 1, *Pterographium sicora*, male, Brazil, Espírito Santo, Linhares [AME]. 2, *Panaropsis semiota*, male, French Guiana, Cayenne, Galion [USNM]. 3, *P. elegans*, male, Panama, Panamá, nr. El Llano [USNM]. 4, *P. elegans*, female, Panama, Colón, Colón [USNM]. 5, *P. thyatira*, male, Brazil, Mato Grosso, Diamantino [USNM]. 6, *P. thyatira*, female, Brazil, Mato Grosso, Colegio Buriti [USNM]. 7, *P. inaria*, male, Brazil, Pernambuco, São Lourenço [USNM]. 8, *P. inaria*, female, Brazil, Pernambuco, São Lourenço [USNM].

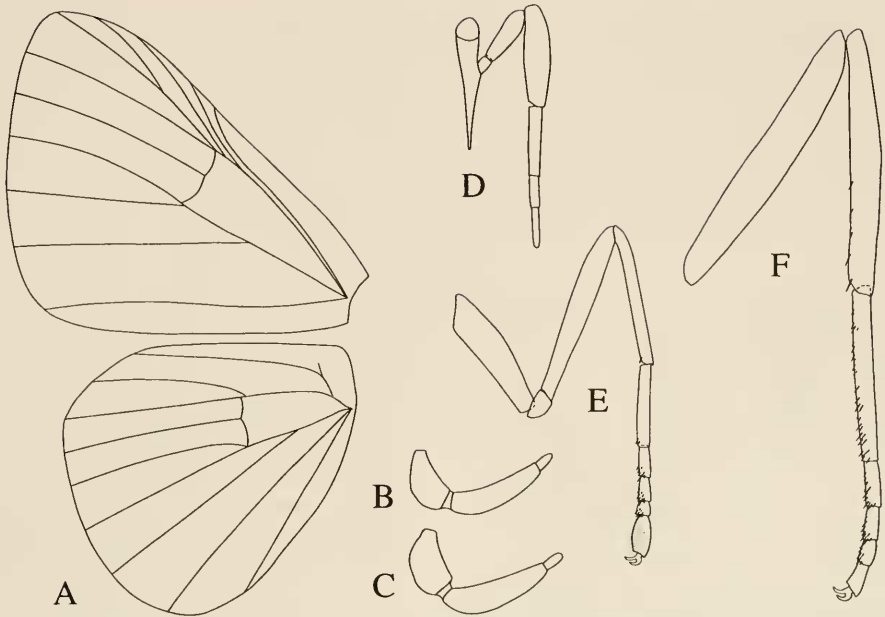


Fig. 9. Morphology of *Panaropsis elegans*. A, Male venation. B, Male palpus. C, Female palpus. D, Male foreleg. E, Female foreleg. F, Male hindleg.

slightly convex; hindwing slightly pointed at apex and tornus. *Venation* (Fig. 9A): four forewing radial veins. *Dorsal surface*: ground color of both wings black; forewing with a diagonal yellow or red postdiscal band and hindwing black or with iridescent blue patch (*semiota* and *elegans*) or both wings with a large orange patch (*thyatira* and *inaria*); patch of erectile androconial setae at base of hindwing cell Cu2, dense in *semiota* and *elegans*, diffuse in *thyatira* and *inaria*; fringe on both wings black. *Ventral surface*: same as dorsal surface but paler and with no iridescence. *Head*: labial palpus entirely black (*semiota* and *elegans*) or with white scaling ventrally (*thyatira* and *inaria*), second and third segments short (Fig. 9B); eye brown and bare, black or white scaling at margins; frons black with white lateral scaling dorsally in *thyatira* and *inaria*; antennal length approximately 70% of forewing length, segments black without white scaling at base; club long and black, tips often orange brown. *Body*: thorax and abdomen broad and robust; dorsal and ventral surface of thorax and abdomen black in

semiota and *elegans*, tegula black with variably prominent red anterior spot in *elegans*; dorsal surface of thorax black with orange tegula and orange lateral scaling, ventral surface black with patches of white scaling in *thyatira* and *inaria*, dorsal surface of abdomen black with remainder orange in *thyatira* and *inaria*, also black scaling ventrally in *inaria*; a narrowly medially divided band of concealed androconial scales on dorsal half of anterior margin of abdominal tergites four and five; tarsus of foreleg trimerous, coxa of medium length for family (Fig. 9D); legs black, midleg and hindleg with a tibial spur, a scattered group of spines along distal inner margin of tibia and two dense rows of spines along distal inner margin of tarsal segments (Fig. 9F). *Genitalia* (Figs. 10–14): overall large; uncus rectangular and produced into small medial point dorsally, falces and tegumen of average size and shape for family; vinculum evenly narrow with medium-sized rounded saccus ventrally; aedeagus short and very broad, everted vesica contains a straight row of approximately ten large an-

teriorly directed spines ventrally that become gradually shorter posteriorly, a large patch of large anteriorly directed spines dorsally that is slightly ventrally curved anteriorly and a sparse lateral patch of very small spines; pedicel short, narrow and strap-like; valvae curl ventrally and slightly overlap, upper portion rectangular, lower portion produced into one or two small rounded projections, setae on valvae typically only on upper rectangular portion and small raised ridge at middle.

Female: Differs externally from male in following ways: forewing length 19–25 mm. Both wings more rounded (and elongate in *thyatira* and *inaria*); ground color of both wings paler; *semiota* and *elegans* not significantly sexually dimorphic, females with no dorsal blue iridescence, broader forewing orange bands and white fringe elements on hindwing and in forewing apex; *thyatira* and *inaria* strongly sexually dimorphic, females with yellow or orange pattern elements divided into subapical and basal areas on forewing, white submarginal hindwing spots present, prominent white hindwing fringe elements present in *thyatira*, some lateral black scaling present on each abdominal segment. *Head:* second segment of labial palpus slightly broader (Fig. 9C). *Body:* foreleg with spines at inner distal tip of tibia and tarsal segments one to four, large ovoid patch of sensilla on swollen last tarsal segment (Fig. 9E). *Genitalia* (Figs. 15–17): corpus bursae elongate and slightly medially constricted, no signa present; ductus bursae short, broad and somewhat sclerotized with tiny spines lining inner surface, becoming suddenly broader and less sclerotized anterior to broad opening of ostium bursae which is positioned in desclerotized invagination between eighth and seventh abdominal sternites; eighth sternite sclerotized and slightly concave medially.

Diagnosis.—Having examined the internal male abdominal morphology of approximately 95% of species in the tribe Symmachiini (males are not known for several

of the remainder) for a paper surveying male androconia in the Riodinidae (Hall and Harvey, in press), it became clear that four species which were currently treated in *Pterographium* (*semiota* and *elegans*) and *Esthemopsis* (*thyatira* and *inaria*) were more closely related to each other than to any other symmachiine species. These four species, which I place in the new genus *Panaropsis*, present a rather heterogeneous external appearance, but their morphology is very homogeneous. The only external similarities are their relatively large size for riodinids, somewhat elongate wing shapes and robust thoraces and abdomens, whereas the only interspecific genital variation lies in differences in the shapes of the valvae and dorsal cornutal band in males. There are two unique male genital synapomorphies for *Panaropsis*. One is the arrangement of the aedeagal cornuti, with a straight row of large spines ventrally, a scattered patch of very small spines laterally and an anteriorly recurved dense band of large spines dorsally. The other is the shape of the valvae, which are curled ventrally to partially overlap and possess a lower portion produced into one or two small “finger-like” projections.

Systematic position.—Although two *Panaropsis* species, *semiota* and *elegans*, externally closely resemble the sole member of *Pterographium*, *sicora*, the male genitalia differ substantially in almost every respect (see Figs. 10–12), suggesting that the two genera may not be closely related. Given the prevalence of aposematic and putatively mimetic coloration in the tribe, such wing pattern convergence would not be surprising. It is presently not certain what the closest relatives of *Panaropsis* are. Only a few *Symmachia* Hübner [1819] species, all *Stichelia* Zikán 1949, one *Mesene* Doubleday 1847, two *Xenandra* C. and R. Felder 1865, and one *Esthemopsis* possess medially divided concealed abdominal androconia on segments four and five as in *Panaropsis*, but none of these taxa closely resemble *Panaropsis* species in external ap-

pearance or morphology. I tentatively place *Panaropsis* near *Pterographium* and *Pirascuca* Hall and Willmott 1996, based on the presence in males of dense erectile androconial setae at the anal margin of the dorsal hindwing (also found in several unrelated *Symmachia* species) and similarities in the ultrastructure of the concealed male abdominal androconial scales (the ultrastructure of these scales has been examined for representatives from each symmachiine genus using scanning electron microscopy), which are elongate, narrow and apically curved in all three genera (see Fig. 18; also illustration in Hall and Willmott (1996) for *Pirascuca*). Those of *Pterographium* and *Pirascuca* are particularly similar to each other.

Proposed classification.—Below is presented a synonymic checklist for *Panaropsis*.

Panaropsis Hall, n. gen.

elegans (Schaus, 1920), **n. comb.**

= *chocoensis* (Callaghan, 1999), **n. syn.**

inaria (Westwood, [1851]), **n. comb.**

= *barca* (Hewitson, [1853])

semiota (Bates, 1868), **n. comb.**

= *similatam* (Zikán, 1949)

thyatira (Hewitson, [1853]), **n. comb.**

= *isabellae* (Sharpe, 1890)

= *perfluxa* (Stichel, 1924)

= *phlegontis* (Stichel, 1910)

= *sarta* (Stichel, 1924)

Biology.—*Panaropsis* species are uncommon to rare inhabitants of wet lowland forests below 1000 m, and little is known of their biology. Males are typically encountered perching in hilltop forest light-gaps, often very high above the ground, and their flight is rapid. Both sexes of *P. elegans* have been recorded nectaring on *Terminalia* and *Croton* flowers (DeVries 1997). All species are brightly and aposematically colored and resemble a number of distasteful moths in the families Arctiidae and Notodontidae.

Distribution.—*Panaropsis* is a pan-Neo-

tropical genus whose species occur from Mexico to western Ecuador, throughout the Guianas and Amazon basin, and into south-eastern Brazil.

Panaropsis semiota (Bates 1868),

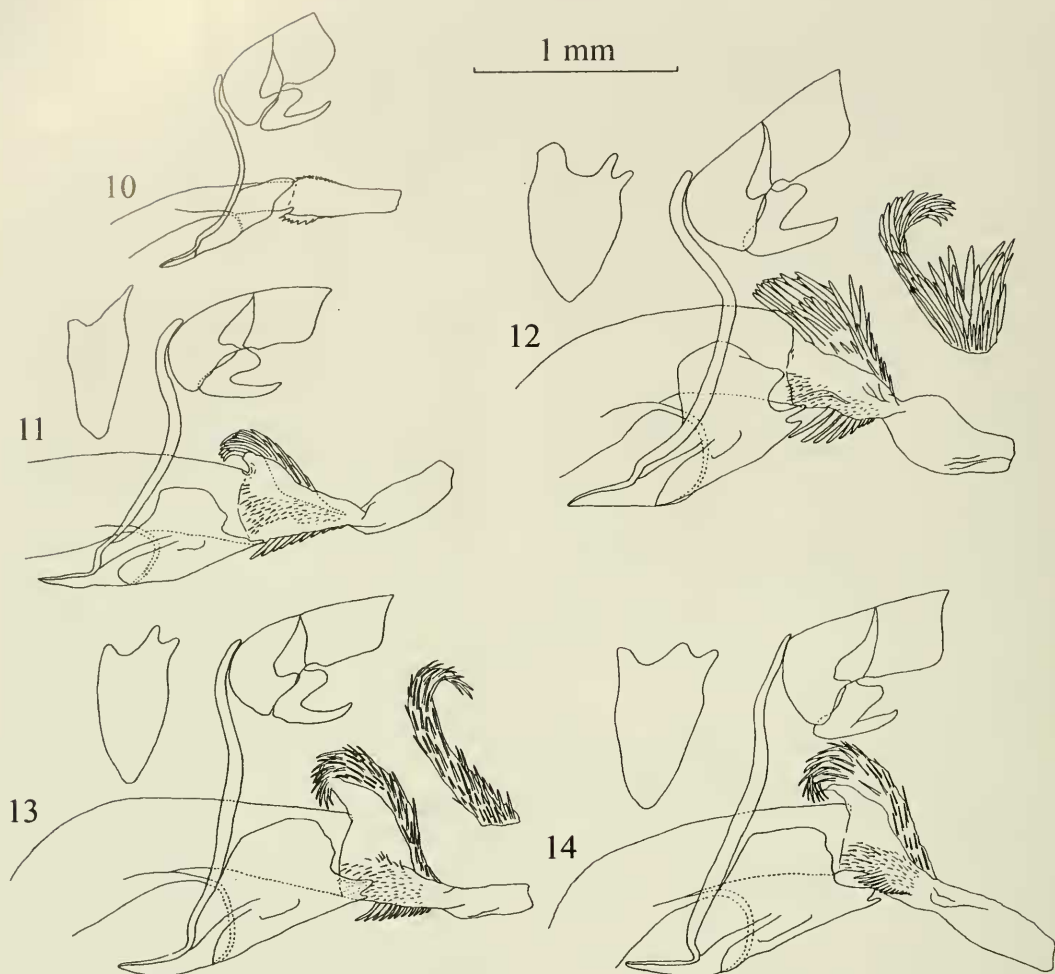
n. comb.

(Figs. 2, 11)

Limnas semiota Bates 1868: 380–381. Type locality: Alter do Chão, Rio Tapajós, E. Brazil. Syntype male BMNH [examined]. *Pterographium similatam* Zikán 1949: 536–538, figs. 1–3. Type locality: São Gabriel, Rio Negro, N. Brazil. Holotype male and allotype female MNRJ [type illustrations examined].

Identification and taxonomy.—Typical FW length: male 17 mm; female 18 mm (Zikán 1949). The taxon *semiota* was long treated in the riordinine genus *Melanis* Hübnér [1819] (Stichel 1910, 1930–31; Bridges 1994), but was transferred, along with the newly synonymized *similatam*, to the monotypic *Pterographium* by Hall and Willmott (1996), on the basis of external similarities with the type species of that genus, *sicora*. *Panaropsis semiota* differs externally from the southeastern Brazilian *Pterographium sicora* only by lacking prominent blue dorsal iridescence and orange scaling at the tip of the abdomen, and by possessing a more robust thorax and abdomen. However, despite the remarkable external similarities, the male genitalia are completely distinct (see Figs. 10 and 11). *Panaropsis semiota* differs from its sister species *P. elegans* by its smaller size, more elongate wing shape and more distally positioned postdiscal forewing band, by lacking an iridescent blue patch on the dorsal hindwing, and in the male genitalia by having a slightly shallower indented notch between the upper and lower portions of the valvae, a lower valve portion with one instead of two small projections and slightly smaller cornutal spines.

Biology.—This very rare species is only known from a handful of specimens in col-



Figs. 10–14. Male genitalia. 10, *Pterographium sicora*. 11, *Panaropsis semiota*. 12, *P. elegans*. 13, *P. thyatira*. 14, *P. inaria*.

lections. Brévignon and Gallard (1998) report finding males in French Guiana perching on forested hilltops between 1330 and 1430 h on top of leaves 3 to 4 m above the ground; their flight is rapid.

Distribution.—Brazil (central and lower Amazon) and French Guiana.

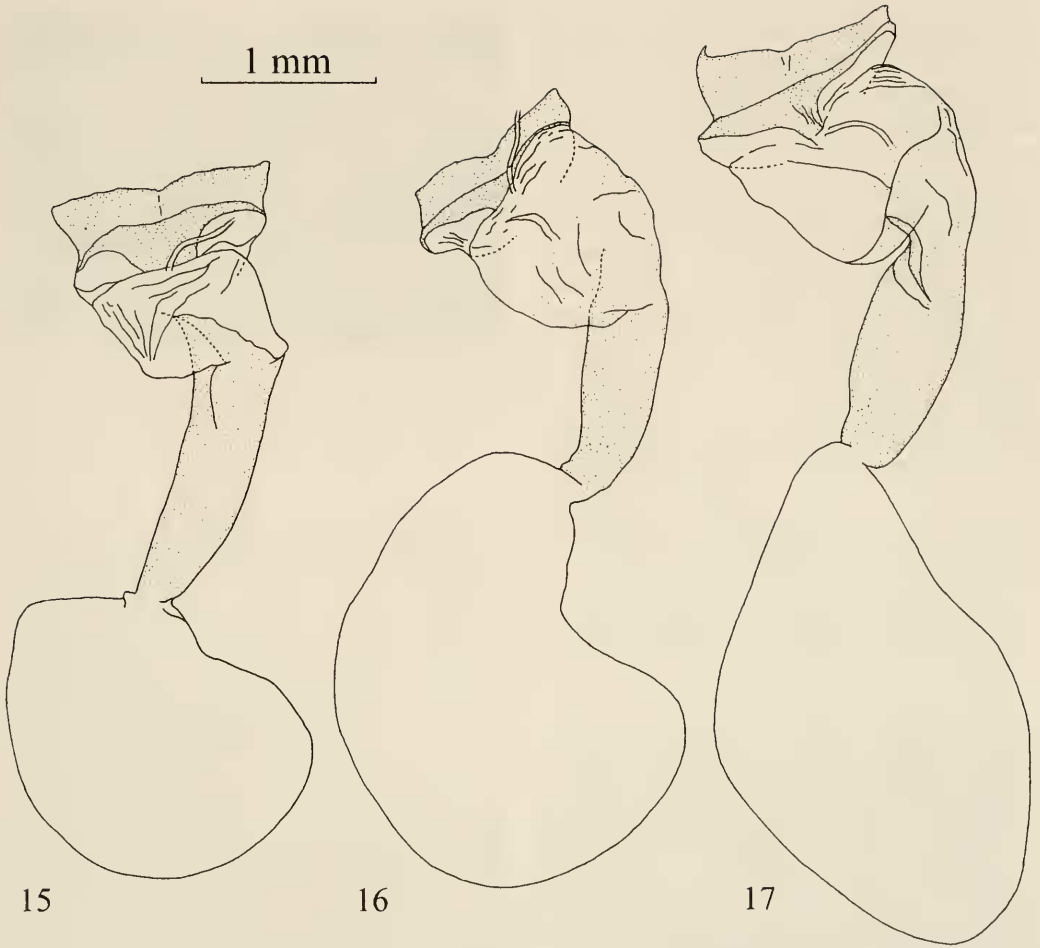
Panaropsis elegans (Schaus 1920),
n. comb.

(Figs. 3–4, 9, 12, 15)

Panara elegans Schaus 1920: 108. Type locality: Cayuga, Guatemala. Syntype males (7) and females (5) USNM [examined].

Pterographium elegans chocoensis Callaghan 1999: 1053, 1055, figs. 25–28. Type locality: Aguas Claras, Río Anchicayá, W. Colombia. Holotype male MUNB [type illustrations examined]. **n. syn.**

Identification and taxonomy.—Typical FW length: male 18 mm; female 21 mm. The taxon *elegans* was described (Schaus 1920) and subsequently treated (Stichel 1910, 1930–31; Bridges 1994) in the genus *Panara* Doubleday 1847, in the tribe Riordinini. Harvey (1987) discovered that males of *elegans* possessed concealed abdominal androconia, placing it in the tribe Symma-



Figs. 15–17. Female genitalia in dorsal view. 15, *Panaropsis elegans*. 16, *P. thyatira*. 17, *P. inaria*.

chiini, but he did not transfer it to any other genus. Callaghan (1997) transferred *elegans* from *Panara* to the symmachiine genus *Pterographium* on the basis of it sharing “erectile scent hairs in cell Cu2-2A of the dorsal hindwing” with the type species of that genus. However, certain members of *Symmachia* and *Pirascia* also possess such hair tufts, and the fact that some members of *Panaropsis* possess such clearly defined hair tufts while others do not (*thyatira* and *inaria*) indicates this structure is homoplasious even at the species-group level, and thus not a reliable generic character.

Both sexes of *P. elegans* possess common rioidinid wing patterns. Within the Symmachiini, males somewhat resemble

Esthemopsis pherephatte (Godart [1824]) and *Pterographium sicora* (Hewitson 1875), but their large size, rounded wing shape and prominent iridescent dorsal hindwing blue patch are distinctive. The female of *P. elegans* resembles those of many species in genera such as *Hypophylla* Boisduval 1836, *Panara*, *Pirascia*, *Setabis* Westwood [1851] and *Symmachia*, but its large size, entirely brown ventral surface and largely white hindwing fringe are diagnostic.

Panaropsis elegans varies slightly geographically. Males from Mexico to Costa Rica typically have dorsal hindwing blue restricted to an ovoid patch in the distal third of the wing and a forewing orange

band that extends to the tornus, whereas in males from Costa Rica eastwards the blue tends to extend more proximally to the discal cell and the forewing orange band does not reach the tornus. The width of the forewing band and its color, which varies from orange to red, and the prominence of red scaling at the anterior tip of the tegula is variable throughout the range of the species. Callaghan (1999) described the subspecies *chocoensis* from a small series of males and females from a single locality in western Colombia on the basis of the male forewing band being red instead of orange. However, since red-banded males occur rarely throughout the range of *P. elegans* (e.g., see the illustrations in d'Abrera (1994) and DeVries (1997) of specimens from Nicaragua and Costa Rica respectively), I synonymize *chocoensis* with *elegans*.

Biology.—*Panaropsis elegans* is an uncommon inhabitant of lowland rainforest from sea-level to 900 m. DeVries (1997) reports finding males in Costa Rica as solitary individuals or in small groups perching along forest edges, trails, streams and in shaded forest light gaps; individuals perched between 2 and 5 m above the ground under leaves from 0800 to 1230 h and their flight was fast and erratic. Callaghan (1999) reports finding males in Colombia perching on hilltops from 1000 to 1200 h under leaves with wings outspread 2 to 3 m above the ground. Both sexes visit flowers of *Terminalia* and *Croton* (DeVries 1997).

Distribution.—Mexico to western Ecuador.

Panaropsis thyatira (Hewitson [1853]),

n. comb

(Figs. 5–6, 13, 16)

Limnas thyatira Hewitson [1853]: pl. 59, fig. 6. Type locality: "Amazon". Syntype female BMNH [examined].

Lymnas isabellae Sharpe 1890: 571, pl. 46, fig. 3. Type locality: Rio Araguaia, S. Brazil. Syntype male BMNH [examined].

Lymnas thyatira phlegontis Stichel 1910:

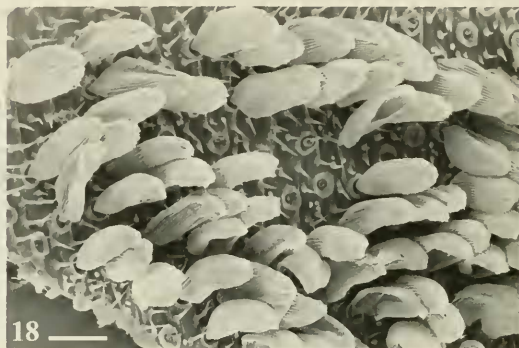


Fig. 18. Scanning electron micrograph of concealed male abdominal androconial scales. Scale bar = 20 μ m.

205. Type locality: Río Songo, Bolivia. Holotype female ZMHU [examined].

Limnas inaria thyatira f. *perfluxa* Stichel 1924: 2. Type locality: Santarém, E. Brazil. Holotype male ZMHU [examined].

Limnas inaria thyatira f. *sarta* Stichel 1924: 2. Type locality: Santarém, E. Brazil. Holotype female ZMHU [examined].

Identification and taxonomy.—Typical FW length: male 17 mm, female 22 mm. The taxon *thyatira* was described (Hewitson 1852–54) and long treated as a species in *Limnas* Boisduval 1836 (now a synonym of *Melanis*), and transferred to *Esthemopsis* as a subspecies of *inaria* by Stichel (1924). It has subsequently remained in *Esthemopsis* and been treated variably as a subspecies of *inaria* (Bridges 1994) or as a full species (d'Abrera 1994; Callaghan and Lamas, in press). I follow Callaghan and Lamas (in press) in regarding *thyatira* as a species distinct from *inaria* because of the substantial differences in the wing pattern and shape of the females and the fact that each species occupies a distinct biogeographic zone (i.e., the Amazon basin and southeastern Brazil).

The male of *P. thyatira* differs from that of *P. inaria* by having orange on the hindwing that extends to the anal margin and predominantly orange instead of black scaling ventrally on the abdomen. The female has a broader wing shape, with orange in-

stead of yellow patterning that forms rays on the forewing. The male and female genitalia of both species do not differ. The male genitalia of *thyatira* and *inaria* differ from those of *semiota* and *elegans* only by having a dorsal cornutal patch that contains narrower spines and is restricted to a narrow band on the left-hand side without the additional contiguous posterior patch on the right-hand side (see Figs. 12 and 13).

Both sexes exhibit some wing pattern variation, which has led to the description of several unwarranted subspecific and infrasubspecific names. In both sexes, the extent of distal orange on both wings is variable, and in males a black interneural line in cell Cu2, as in the female, and submarginal white spots on the ventral hindwing may be present or absent.

Biology.—Brévignon and Gallard (1998) report finding males of this uncommon species in French Guiana perching on hilltops between 1530 and 1645 h on top of leaves 5 m above the ground. In Ecuador, males were similarly encountered singly or in small groups perching on a forested hilltop 10 to 15 m above the ground on top of sunlit leaves with their wings outspread (Hall and Willmott, unpubl. data). Notably, the female resembles a number of nymphalid heliconiine species, such as *Dryas julia* (Fabricius 1775), *Eueides lineata* Salvin 1868 and *Eueides aliphera* (Godart 1819).

Distribution.—Colombia to Bolivia, Brazil (Amazon and southern Brazil) and the Guianas.

Panaropsis inaria (Westwood [1851]),

n. comb.

(Figs. 7–8, 14, 17)

Limnas inaria Westwood [1851]: 460, pl. 73, fig. 7. Type locality: "Brazil". Syntype male BMNH [examined].

Limnas barca Hewitson [1853]: pl. 60, fig. 12. Type locality: Rio de Janeiro, S.E. Brazil. Syntype female BMNH [examined].

Identification and taxonomy.—Typical FW length: male 17 mm, female 21 mm.

The taxon *inaria* was also described (Westwood 1850–52) and long treated as a species in *Limnas* and transferred to *Esthemopsis* by Stichel (1910). *Panaropsis inaria* is distinguished from its sister species, *P. thyatira*, in the previous species account. Note that the substantial sexual dimorphism in both these species led to the description of each sex as separate species. *Panaropsis inaria* and *P. thyatira* externally most closely resemble *Machaya obstinata* Hall and Willmott 1995, from the Andes of eastern Ecuador, but that species has reduced orange on both wings, an entirely black ventral hindwing and a black thorax and abdomen.

Biology.—Nothing is known about the biology of this uncommon species.

Distribution.—Southeastern Brazil (Rio de Janeiro to Pernambuco).

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LITERATURE CITED

- Bates, H. W. 1868. A catalogue of Erycinidae, a family of diurnal Lepidoptera. *Journal of the Linnean Society of London (Zoology)* 9: 373–459.
- Brévignon, C. and J.-Y. Gallard. 1998. Inventaire des Riodinidae de Guyane Française IV—Riodinidae: Symmachiini, Charitini, Helicopini. *Description de nouveaux taxa (Lepidoptera)*. *Lambillionea* 98(2): 304–320.
- Bridges, C. A. 1994. *Catalogue of the Family-Group, Genus-Group and Species-Group Names of the Riodinidae and Lycaenidae (Lepidoptera) of the World*. C. Bridges, Urbana, IL. 1113 pp.
- Callaghan, C. J. 1997. A review of the genus *Panara* Doubleday, 1847 (Riodinidae) in southeast Brazil.

- with a description of two new subspecies. *Journal of Research on the Lepidoptera* 34: 21–38.
- . 1999. New taxa of Neotropical Riodinidae (Lepidoptera). *Revista Brasileira de Zoologia* 16(4): 1045–1064.
- Callaghan, C. J. and G. Lamas. In press. Riodinidae. In Lamas, G., ed. A Checklist of the Neotropical Butterflies and Skippers (Lepidoptera: Papilionoidea and Hesperioidea). Atlas of Neotropical Lepidoptera (ed. by J. B. Heppner). Scientific Publishers, Gainesville, FL.
- Comstock, J. H. and J. G. Needham. 1918. The wings of insects. *American Naturalist* 32(376): 231–257.
- d'Abrera, B. 1994. Butterflies of the Neotropical Region, Part VI. Riodinidae. Hill House, Victoria, Australia, pp. 880–1096.
- DeVries, P. J. 1997. The Butterflies of Costa Rica and their Natural History. Volume II: Riodinidae. Princeton University Press, Princeton, NJ. 288 pp.
- Eliot, J. N. 1973. The higher classification of the Lycaenidae (Lepidoptera): A tentative arrangement. *Bulletin of the British Museum of Natural History (Entomology)* 28(6): 373–506.
- Hall, J. P. W. 1999. A Revision of the Genus *Theope*: Its Systematics and Biology (Lepidoptera: Riodinidae). Scientific Publishers, Gainesville, FL. 127 pp.
- Hall, J. P. W. and D. J. Harvey. In press. A survey of androconial organs in the Riodinidae (Lepidoptera). *Zoological Journal of the Linnean Society*: in press.
- Hall, J. P. W. and K. R. Willmott. 1996. Systematics of the riodinid tribe *Symmachiini*, with the description of a new genus and five new species from Ecuador, Venezuela and Brazil (Lepidoptera: Riodinidae). *Lambillionea* 96: 637–660.
- Harvey, D. J. 1987. The Higher Classification of the Riodinidae (Lepidoptera). University of Texas Austin. Ph.D. Dissertation. 216 pp.
- Hewitson, W. C. 1852–1854. Illustrations of New Species of Exotic Butterflies, Selected Chiefly from the Collections of W. Wilson Saunders and William C. Hewitson. 2(2–10). J. Van Voorst, London.
- Klots, A. B. 1956. Lepidoptera, pp. 97–110. In Tuxen, S. L., ed. Taxonomists' Glossary of Genitalia in Insects. Munksgaard, Copenhagen.
- Schaus, W. 1920. New species of Lepidoptera in the United States National Museum. *Proceedings of the United States National Museum* 57(2307): 107–152.
- Sharpe, E. M. B. 1890. Collection of Lepidoptera made by Mr. Edmund Reynolds on the rivers Tocantins and Araguaya and in the province of Goiaz, Brazil. *Proceedings of the Zoological Society of London* 1890(3): 552–577.
- Stichel, H. F. E. J. 1910–11. Family Riodinidae. Allgemeines. Subfamily Riodininae, pp. 1–452. In Wytzman, P., ed. *Genera Insectorum* 112A–B. P. Wytzman, Brussels.
- . 1924. Zur Systematik der Riodinidae (Lep., Rhop.). *Neue Beiträge Systematischen Insektenkunde* 3(1): 1–3.
- . 1930–31. Riodinidae., pp. 1–795. In Strand, E., ed. *Lepidopterorum Catalogus* 38–41. W. Junk, Berlin.
- Westwood, J. O. 1850–52. In Doubleday, E., ed. The Genera of Diurnal Lepidoptera: Comprising their Generic Characters, a Notice of their Habits and Transformations, and a Catalogue of the Species of each Genus. Longman, Brown, Green and Longmans, London. 534 pp.
- Zikán, J. F. 1949. Observações sobre os componentes dos gêneros *Phaenochitonia* Stichel e *Pterographium* Stichel, com a descrição de uma nova espécie e criando um novo gênero (Riodinidae, Lepidoptera). *Revista de Entomologia* 20(1/3): 535–539.